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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/024,699	12/21/2001	Satoshi Seo	12732-088001	6811

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EXAMINER	
HODGES, MATTHEW P	

ART UNIT	PAPER NUMBER
2879	

DATE MAILED: 12/01/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	10/024,699	SEO ET AL.	
	Examiner	Art Unit	
	Matt P Hodges	2879	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *01 September 2004*.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *5-28,31-40 and 43-104* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *5-28,31-40 and 43-104* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☒ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *21 December 2001* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☒ All b)☐ Some * c)☐ None of:

1.☒ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☐ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date *9/1/2004*.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

DETAILED ACTION

Response to Amendment

The Amendment, filed on 9/01/2004, has been entered and acknowledged by the Examiner.

Cancellation of claims 1-4, 29, 30, 41, and 42 has been entered.

Specification

The title of the invention is not descriptive. A new title is required that is clearly indicative of the invention to which the claims are directed.

Specifically the title should distinguish itself from other applications in the same subclass. One example might be to include "with mixed layers" or something similarly drawn to the claimed subject matter.

Appropriate correction is required.

Claim Rejections - 35 USC § 102

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

Claims 13-24, and 47-52 are rejected under 35 U.S.C. 102(e) as being anticipated by Aziz et al. (US 6,392,339).

Regarding claims 13-24, Aziz discloses (see figure 2) an organic light emitting device comprising an anode (34), a cathode (42), a hole transporting layer (36) including a hole transport compound, an electron transporting layer (40) including a electron transport compound,

and a mixed region (38) including a mixture of the hole transport compound and the electron transport compound. (Column 4 lines 35-56). Aziz further discloses the use of multiple layers for the mixed region. The multiple layers are varied in mixing ratios. For instance when two layers are present the concentration of the first organic compound decreases in the region closest to the second organic compound layer. (Column 9 lines 60-65). Further the mixed region can contain multiple layers where one of these layers is a light emitting layer and additional mixed region layers exist between the light emitting layer and the hole transport layer. Further the ratio of the organic compounds varies in the mixed layer made of more than one sub layer, each of a different ratio. The mixed layers also similarly exist between the light emitting layer and the electron transporting layer.

Regarding claims 47-52, Aziz further discloses the use of optoelectronic devices including the organic light emitting elements described. (Column 1 lines 5-10)

Claims 13-28, 35-40, 47-68, 81-104 are rejected under 35 U.S.C. 102(e) as being anticipated by Aziz et al. (US 6,392,250).

Regarding claims 13-24, Aziz discloses (see figure 2) an organic light emitting device comprising an anode (34), a cathode (42), a hole transporting layer (36) including a hole transport compound, an electron transporting layer (40) including a electron transport compound, and a mixed region (38) including a mixture of the hole transport compound and the electron transport compound. (Column 5 lines 10-30). Aziz further discloses the use of multiple layers for the mixed region. The multiple layers are varied in mixing ratios. For instance when two layers are present the concentration of the first organic compound decreases in the region closest

to the second organic compound layer. (Column 12 lines 45-56). Further the mixed region contains multiple layers where at least one of these layers includes a separate light-emitting compound providing a light-emitting layer. The light-emitting compound is an organometallic compound and is phosphorescent, thus exhibiting a triplet excitation. Further additional mixed region layers exist between the light emitting layer and the hole transport layer as described above. The ratio of the organic compounds varies in the mixed layer made of more than one sub layer, each of a different ratio. Specifically the ratios of the hole transporting compound the electron transporting compound vary however both vary in relation to the light emitting compound as well. Further mixed layers also similarly exist between the light emitting layer and the electron transporting layer. (Column 11 lines 60-65).

Regarding claims 25-28, Aziz teaches the use of a light emitting dopant in the light emitting layer that is the emitter for the organic light emitting device. Therefore the difference in energy between the highest occupied molecular orbital and the lowest unoccupied molecular orbital of the first compound is necessarily smaller than the difference the difference in energy between the highest occupied molecular orbital and the lowest unoccupied molecular orbital of the second and third compounds. Further Aziz discloses the use of more than one dopant in the light-emitting layer where both dopants would satisfy the condition above.

Regarding claims 35-40, Aziz discloses the use of an organic compound in the light emitting layer or doped into the mixed layer that emits light from a triplet excitation state.

Regarding claims 47-52, Aziz further discloses the use of optoelectronic devices including the organic light emitting elements described. (Column 1 lines 5-10)

Regarding claim 53, Aziz discloses the device as claimed (see rejection of claims 13-24 above).

Regarding claims 54-56 and 58-60, Aziz discloses the device as claimed (see rejection of claims 13-24 and 25-28 above). The hole transporting layer includes a hole transporting region along the surface of the hole transporting layer and the first mixed layer and it includes a hole injection region along the surface of the hole transporting layer and the anode. The electron transporting layer includes an electron transporting region along the surface of the electron transporting layer and the second mixed layer and it includes an electron injection region along the surface of the electron transporting layer and the cathode.

Regarding claim 57, Aziz discloses the device as claimed (see rejection of claims 13-24 above) and additionally allows for the use of a two dopants in the mixed regions including the light-emitting layer (see rejection of claims 25-28 above).

Regarding claims 61-68, Aziz further discloses the use of the conjugate system of polyaniline acid doped. Though Aziz does not specify the doped acid it is well established to use Lewis acids as the dopants in hole transporting layers.

Regarding claims 81-88, Aziz discloses the use of an organic compound in the light emitting layer or doped into the mixed layer that emits light from a triplet excitation state.

Regarding claims 89-96, Aziz discloses the use of a concentration gradient in the mixed regions (see rejection of claims 13-24 above).

Regarding claims 97-104, Aziz further discloses the use of optoelectronic devices including the organic light emitting elements described. (Column 1 lines 5-10)

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

Claims 5-12, 31-34, and 43-46, are rejected under 35 U.S.C. 103(a) as being unpatentable over Aziz et al (US 6,392,339) and further in view of So et al. (US 5,925,980)

Regarding claims 5-12, 31-34, and 43-46, Aziz discloses the device as described in the rejection of claim 13 above, and further states that the hole transporting layer and electron transporting layers can optionally contain multiple layers where the layer closest to the anode would be the hole injection layer and the layer closest to the cathode would be the electron injecting layer. Aziz also discloses the use of various materials for the hole transport and electron transport compounds. However Aziz does not appear to exemplify the use of a mixed region between the layers, where the concentration of the first and second organic compounds changes continuously in the mixed region. So, in the analogous art of organic electroluminescent devices with graded regions, discloses (see abstract) the graduated region between a first organic region and a second organic region changes continuously in the mixed region between the two layers. So further discloses (column 4 lines 13-25) because of continuous change from the first organic region to the second organic region the two materials are intermixed and disseminated so that no fixed interface is formed and adhesion problem of the two layers is resolved. The mixed region appears as a single layer of material which cannot separate and generally allows a smooth movement of carriers there across. This results in an improved organic electroluminescent

device with improved reliability and operation (column 1 lines 60-65). Thus it would have been obvious to one of ordinary skill in the art at the time of invention to modify the mixed region of Aziz as continuous region as taught by So for resolving the problem of adhesion of two organic layers, smooth movement of carriers across the mixed region and resulting in an improved organic electroluminescent device with improved reliability and operation.

Claims 69-80 are rejected under 35 U.S.C. 103(a) as being unpatentable over Aziz et al. (US 6,392,250).

Regarding claims 69-72, Aziz discloses the invention as claimed (see rejection of claims 61-64 above) but does not appear to specify the use of a halogen element in the Lewis Acid. However the applicant fails to identify the use of a halogen as the Lewis Acid to solve any problem or yield any unexpected result that is not within in the scope of the teachings relied upon. Further the use a halogen element in the Lewis Acid is well known in the art of organic EL devices. It would have been an obvious design choice to one having ordinary skill in the art to incorporate the use of a halogen element in the Lewis Acid to the organic EL device as taught by Aziz, since such a modification would involve a mere substitution of a known composition for a known purpose.

Regarding claims 73-76, Aziz discloses the invention as claimed (see rejection of claims 55-60 above) but does not appear to specify the use of a conjugate system organic compound doped with a Lewis Base as the electron injecting compound. However the applicant fails to identify the use of a conjugate system organic compound doped with a Lewis Base as the electron injecting compound to solve any problem or yield any unexpected result that is not

within in the scope of the teachings relied upon. Further the use of a conjugate system organic compound doped with a Lewis Base as the electron injecting compound is well known in the art of organic EL devices. It would have been an obvious design choice to one having ordinary skill in the art to incorporate the use of a conjugate system organic compound doped with a Lewis Base as the electron injecting compound to the organic EL device as taught by Aziz, since such a modification would involve a mere substitution of a known composition for a known purpose.

Regarding claims 77-80, Aziz discloses the invention as claimed (see rejection of claims 73-76 above) but does not appear to specify the use of an alkaline metal element in the Lewis Base. However the applicant fails to identify the use of an alkaline metal element as the Lewis Base to solve any problem or yield any unexpected result that is not within in the scope of the teachings relied upon. Further the use an alkaline metal element in the Lewis Base is well known in the art of organic EL devices. It would have been an obvious design choice to one having ordinary skill in the art to incorporate the use of an alkaline metal element in the Lewis Base to the organic EL device as taught by Aziz, since such a modification would involve a mere substitution of a known composition for a known purpose.

Response to Arguments

Applicant's arguments filed 9/01/2004 have been fully considered but they are not persuasive.

Regarding applicant's assertion that Aziz ('339 and '250) fails to teach the use of a mixed layer between a light-emitting layer and either the hole transport layer or the electron transport layer or both, examiner respectfully disagrees. As described in the rejection, Aziz discloses the

use of multiple layers in the mixed region (38) which for the purposes of the rejection included mixed layers of hole transport material, light-emitting material, and electron transporting material. One of the mixed layers inside of the mixed region is considered by the examiner for the purposes of the rejection to be the light-emitting layer. Therefore as described mixed regions exist between the various layers including between the light-emitting region and the hole and electron transporting layers.

Regarding applicant's assertion that the combination of Aziz ('339) in view of So ('980) does not disclose the use of a mixed layer between the electron transporting region and an electron injecting region or the hole transporting region and a hole injecting region, examiner respectfully disagrees. As stated in the rejection, Aziz discloses the use of multiple layers for use as the hole transporting and electron transporting region. The multiple layers can include more than one organic or inorganic materials to improve injection and transportation of holes or electrons. Thus for the purposes of examination Aziz discloses the use of, for example, a hole transporting layer at the top of the multi-layer stack which encompasses the hole transporting region, and a hole injection region at the bottom of the same stack. The layers between do not appear to be disclosed to be graduated however So, in the same field of endeavor, resolves that deficiency by providing for a graduated mixed layer between the two layers of organic material in order to advantageously provide the benefits stated in the rejection above.

Conclusion

The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

Shi et al. (US 6,130,001) discloses the use of mixed layers between organic regions.

THIS ACTION IS MADE FINAL. Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

Contact Information

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Matt P Hodges whose telephone number is (571) 272-2454. The examiner can normally be reached on 7:30 AM to 4:00 PM M-F.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Nimesh Patel can be reached on (571) 272-2457. The fax phone number for the organization where this application or proceeding is assigned is (703) 872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

mph

Joseph Williams